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We are pleased to note that for the first time in any somewhat general treatise of botany the Hepaticæ have received something like their proper treatment, and their representative position as a highly important group from the standpoint of phylogeny is clearly stated at the outset and strikingly developed through the work. A fair estimate of their differentiation and highly probable antiquity is also well set forth.

Dr. Campbell regards the lowest Metzgeriaceæ, like *Sphærocarpus*, as the simplest plants of the entire group and considers that the other groups of the Hepaticæ were differentiated from the ancestors of some plant of this character before the development of the sporophyte had advanced so far as in present forms of that genus. He sets forth a most excellent answer to the remarkable position of Goebel regarding the status of *Buxbaumia* and contributes several new points bearing on the interrelationships of the various groups of the true mosses.

In classification Dr. Campbell does not depart widely from arrangements that have heretofore been set forth, in the Hepaticæ, for instance, following the lead of Schiffner. The position of *Isoetes* as the possible ancestor of the Angiosperms is perhaps the most divergent point presented in the classification.

Comparison of the work of others is well made, and wherever criticism occurs it is always in the friendly, urbane spirit that ought always to characterize workers in science; where conclusions are stated, they are couched in pointed and forcible language but never dogmatically. Altogether the work is a valuable contribution and will stand comparison with the best work of the kind that has been done anywhere.

L. M. UNDERWOOD.

Molecules and the Molecular Theory of Matter, by A. D. RISTEEN, S. B. Ginn & Co. Octavo, pp. 213.

This is an excellent resumé of the present state of our knowledge of the molecular theory, excluding most of the more difficult mathematical discussions, and including the principal conclusions of Clausius, Kelvin, Boltzmann, Maxwell and many others who have cultivated this department of physical science.

After some general considerations involving

a presentation of the hypothesis of molecules and a definition of what is meant by a molecule, together with a brief statement of the assumed molecular constitution of solids, liquids and gases, the kinetic theory of gases is seriously taken up. The fundamental assumptions of the theory are discussed, Maxwell's Theorem is proved and the statistical method of treatment illustrated. The results of the kinetic theory are compared with the results of observation, and the chapter includes an examination of high vacua phenomena, the radiometer and other of Crookes' experiments.

The chapter on the Molecular Theory of Liquids includes, among other things, a fairly complete elementary study of surface tension and the phenomena of films. Chapter IV. is given to the Molecular Theory of Solids, concerning which there is really little known, but interesting studies of the phenomena of solution, diffusion, crystallization, etc., are here given. The concluding chapters on the Molecular Magnitude and the Constitution of Molecules are important and well done. The principal methods for determining molecular dimensions are gone into pretty thoroughly and the more recent hypothesis in regard to the constitution of the ether and the nature of matter are presented with great clearness and some fullness.

Among a few unimportant criticisms of the book that suggest themselves may be mentioned the holding on to the 'lecture' form of presentation. The foundation of the work was a lecture given by the author before the Washburn Engineering Society of the Worcester Polytechnic Institute, but it has been so expanded, and so much additional material has been supplied that it exceeds the limits of several lectures. As a large part of the new material is not in the lecture form and as little is gained by retaining it anyhow, it is to be regretted that the author did not reject it in the beginning.

As an echo of the discussion which occurred at the recent meeting at Springfield of the Society for the Promotion of Engineering Education, it may be well to note that on one or two pages this book illustrates the fatal results which are almost sure to follow the use of the formula $W=mg$, in the good old orthodox way. The author is lucky, however, in having apparently

followed Dr. Oliver Lodge who said that "The real rule on Engineers' principles would be to put 'g' somewhere into the expression for any quantity with which gravity has nothing to do, and to leave 'g' out whenever gravity is primarily concerned." By conscientiously adhering to this rule one may come out fairly well in the end, but in the present instance the confusion is more likely to be due to an oversight. On the whole the book will be a welcome addition to the library of any physicist who desires to avoid the necessity for much laborious research among original sources.

SCIENTIFIC JOURNALS.

AMERICAN CHEMICAL JOURNAL, DECEMBER.

THE principal article in this number of the Journal is one by C. F. Mabery on the composition of the Ohio and Canadian sulphur petroleum. In this article, which is only a partial report of the work, he reviews and discusses the work of other chemists in this field, and describes methods and forms of apparatus used in his investigations. As decomposition takes place in the distillation of crude petroleum during refining process, he could not use these products, but started with the crude oil and subjected it to fractional distillation *in vacuo*, in apparatus specially devised for this purpose. He found in the distillation of Ohio petroleum that no color or odor could be detected in the distillates below 235°; but above this point decomposition took place with evolution of hydrogen sulphide. The amount of ash left was small, and consisted chiefly of lime and magnesia, showing that the oil had dissolved some of the constituents of the rocks forming the cavities in which it was confined. A number of the lower-boiling hydrocarbons belonging to the methane series were isolated, and it was found that they were present in smaller quantities in the Ohio petroleum than in that from Pennsylvania.

Stillman and Yoder find that the compound formed by the action of anhydrous ammonia on aluminium chloride is $\text{AlCl}_3 \cdot 6\text{NH}_3$. In their experiments dry air and ammonia were passed over aluminium chloride, and a partial decomposition of the product formed was always observed. The ammonia was partly oxidized,

and water, aluminium oxide, and ammonium chloride formed.

Schlundt and Warder in an article, entitled, 'The Chemical Kinetics of Oxidation,' contribute some results on the speed of reactions under different circumstances. They find that the rate of liberation of iodine in a mixture of potassium chlorate, potassium iodide and hydrochloric acid is influenced by temperature, concentration and amount of excess of inorganic acid present.

L. W. McCay publishes a preliminary notice on the existence of the sulphoxyantimonates. He finds that the salt prepared by Rammelsberg, and supposed by him to be a double salt, is potassium orthodisulphoxyantimonate.

Freer gives the results of some experiments with tetrinic acid which are not in accord with the views of Nef and others on this subject. He finds that by the action of bromine on methyl-acetoacetic ester or its sodium salt, a uniform product is not obtained, but a mixture of four compounds. Two of these products are α - and γ -bromomethylacetoacetic ester. From the latter tetrinic acid is easily formed; but, from the former, only in the presence of hydrobromic acid. There is a review in this number of 'The Principles and Practice of Agricultural Analysis' by H. W. Wiley, and obituary notices of Louis Pasteur and Felix Hoppe-Seyler.

J. ELLIOTT GILPIN.

NEW BOOKS.

Die Haustihere. EDWARD HAHN. Leipzig, Duncker & Humblot. 1896. Pp. x+581.

Lecture Notes on Theoretical Chemistry. FERDINAND G. WEICHMANN. 2d edition. New York, John Wiley & Sons; London, Chapman & Hall, Lt'd. 1895. Pp. viii+288.

Manual of Lithology. EDWARD H. WILLIAMS. 2d edition. New York, John Wiley & Sons; London, Chapman & Hall, Lt'd. 1895. Pp. 418.

Report of the Columbian Historical Exposition. Madrid, 1892; Washington, 1895. Pp. 411.

Lessons in Elementary Botany. THOMAS H. MACBRIDE. Allyn & Bacon, 1896. Pp. xi + 233. Introductory price, 60 cts.